

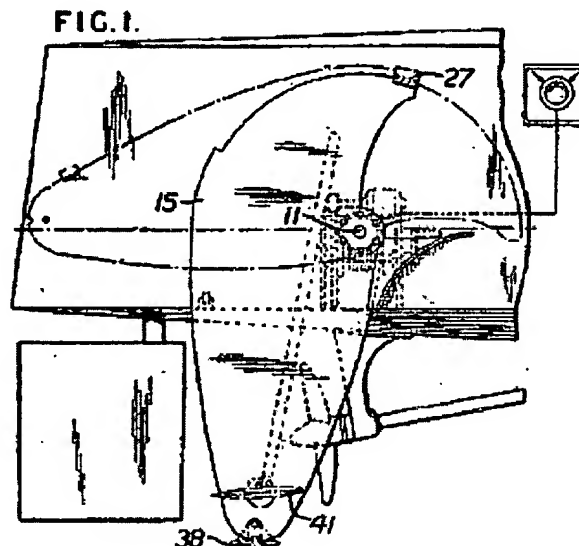
## Improvements in or relating to means for stabilising marine vessels

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**Publication date:** 1938-10-06  
**Inventor:**  
**Applicant:** NOEL PEMBERTON BILLING  
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**Application number:** GB19370009795 19370406  
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### Abstract of GB493373

493,373. High-speed boats. BILLING, N. P. April 6, 1937, No. 9795. [Class 113 (ii)] The stern of a high-speed boat is provided with fins 15, one on each side of the propeller and mounted for rotation about the horizontal shaft 11 so that their depth of submergence can be regulated. Guides 27 engage the edge of the fin to make it rigid, which is also provided with a foot 38 and a detachable planing surface 41. The fins may also be adjustable middlewise in place of or in addition to the usual rudder. In a modification, the fins slide in guides instead of turning around a shaft.



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# PATENT SPECIFICATION

Application Date: April 6, 1937. No. 9795/37.

493,373

Complete Specification Left: June 25, 1937.

Complete Specification Accepted: Oct. 6, 1938.

## PROVISIONAL SPECIFICATION

### Improvements in or relating to Means for Stabilising Marine Vessels

I, NOEL PEMBERTON BILLING, a British Subject, of London Laboratories, Royal Court Chambers, Sloane Square, London, S.W.1, do hereby declare the nature of this invention to be as follows:—

This invention consists in improvements in or relating to means for stabilising navigable marine vessels and applies particularly to shallow draught and fast moving vessels commonly termed "speed boats".

With boats of this type it is found that whereas their performance is generally very good in a calm sea they are difficult to handle in rough weather owing to the fact that their shallow draught permits them to yaw or veer from their course under the force of the wave particularly in a quartering sea.

An object of this invention is to overcome this drawback and accordingly adjustable fins are provided situated at or near the stern and on opposite sides of the propeller. The fins are made adjustable as to the depth to which they may be immersed and are held in their adjusted positions so that they are substantially rigid with the hull of the boat and provide what may be considered as the equivalent of keel members situated on opposite sides of the fore and aft centre line.

In a preferred form these fins are streamline in contour so as to offer the smallest possible resistance to their passage through the water.

When the boat is travelling in smooth water, or even when it is travelling through a head or following sea, the fins may be raised out of operation so as to remove entirely such resistance as they may offer to the passage of the boat. At times when they are required to give directional stability to the boat they may be lowered to any degree up to their maximum immersible depth according to requirements.

In a preferred form the fins are pivotally mounted on a cross-shaft and the latter can be rotated through any convenient mechanism or gearing so as efficiently and rapidly to adjust the fins to required positions. Each of the fins

preferably extends on opposite sides of the axis of rotation so that when lower portions of the fins are immersed upper portions may be engaged in guides such as arcuate slots or other equivalent parts in order to hold them rigidly with their surfaces directed fore and aft.

Obviously, the fins may be made adjustable in other ways. For instance, they may be hinged to swing up clear of the water or down into the water, lying in their inoperative positions against the sides of the boat or under the bottom thereof, but in this case the depth of immersion will not be adjustable as they must be either fully immersed or fully inoperative. Alternatively, they may slide up and down in guides provided in the hull of the vessel or on the outside thereof; or they may be completely detachable and in this case means will be afforded to receive and hold them in their operative positions when they are inserted into place.

Another disadvantage in existing craft of this nature is that the propeller is unprotected should the vessel run aground and, moreover, when the vessel is to be transported out of the water it is necessary to provide a cradle to support the hull and to protect the propeller and propeller shaft.

The present invention overcomes the difficulties just mentioned because if the vessel is likely to run aground it is only required to lower the fins to afford supports for the after portion of the hull on which it can rest to keep that portion of the hull sufficiently raised so as to protect the propeller from damage. The same applies also during transportation and the fins, when they are lowered, virtually constitute a cradle.

In order that the fins may be more effective as stern supports when the vessel is aground flat plates or feet may be attached to the lower ends of the fins with the surfaces of the feet disposed in planes transverse to the lengths of the fins. These plates may have screw-threaded or other pins or studs by which they can be inserted and secured correspondingly formed sockets in the

ends of the fins. In this way the plates are readily detachable and will be only used at times when it is desired to use the fins as stern supports for the pro-  
5 tection of the propeller.

In the case in which the fins are mounted on a cross-shaft or are otherwise pivotally mounted to move into the required positions locking devices will  
10 be provided to hold them against rotation when they are moved down to act as stern supports. The locking devices, or at least a locking device, may be the gearing itself by which the fins are  
15 rotated; but in the case in which no gearing is employed locking devices may be constituted by studs and lock-nuts projecting from the hull of the boat to enter slots in  
20 the fins as the latter are swung into their fully downward position. The lock-nuts can then be tightened to retain the fins in their lowered positions and conveniently two retaining devices of  
25 this kind will be provided forming, with the pivot of each fin supports for the latter situated at three points of a triangle.

The invention is not restricted to the  
30 simultaneous use of both fins as either one or the other may be utilised at will, and if mechanical means is provided for adjusting the fins into position this mechanism may be made so as to be  
35 differentially adjustable. In this way either or both fins may be used and when both fins are used they may be differentially adjusted, if desired.

Furthermore, in place of the feet  
40 above-described fin-shaped elements may

be utilised disposed in planes at right angles to the general planes of the main fins according to this invention. These supplemental or additional fins may be detachably or permanently secured in  
45 position and when in use will have the effect not only of providing for the support of the craft as already described but also will afford a tendency to lift the craft as it travels through the water. 50  
The supplemental fins if they are permanently secured in position may be made adjustable about axes extending in the fore and aft direction of the main fins to which they are attached in order  
55 that they may be folded to a position permitting the main and supplemental fins together to be lifted entirely out from the water.

It is within the invention to construct  
60 the fins so that as a whole or in part they may be adjusted rudderwise for steering purposes and they may be used in place of or as an assistance to the usual rudder. They may be separately actuated for  
65 steering purposes or they may be coupled to the rudder so as to move in conformity therewith.

The rudder itself may be of the type  
70 that can be raised and lowered so as to adjust the depth of immersion to give the optimum position having regard to elimination, as far as possible, of rudder resistance.

Dated this 6th day of April, 1937.  
BOULT, WADE & TENNANT,  
111 & 112, Hatton Garden, London,  
E.C.1,  
Chartered Patent Agents.

## COMPLETE SPECIFICATION

### Improvements in or relating to Means for Stabilising Marine Vessels

75 I, NOEL PEMBERTON BILLING, a British Subject, of London Laboratories, Royal Court Chambers, Sloane Square, London, S.W.1, do hereby declare the nature of this invention and in what manner the  
80 same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention consists in improvements in or relating to means for stabilising navigable marine vessels and applies  
85 particularly to shallow draught and fast moving vessels commonly termed "speed boats" although it is not to be held as limited to application only to  
90 this class of boat.

With vessels of the speed boat type it is found that whereas their performance is generally very good in calm water they

are difficult to handle in rough weather owing to the fact that their shallow  
95 draught permits them to yaw or veer from their course under the force of the waves, particularly in a quartering sea.

Various proposals have already been made to correct this lack of directional  
100 stability and in one such previous proposal permanently submerged and relatively short fins have been provided under water at the stern of the vessel and on either side of a propeller, the fins  
105 being mounted rudderwise to serve not only for the purpose of increasing the stability of the vessel but also of steering it.

In another proposal it has been sug-  
110 gested to provide fins extending on each side of the vessel fore and aft for sub-

stantially the whole length of the submerged portion of the vessel and to raise and lower these fins about axes situated at the sternmost upper corners of the 5 fins.

The present invention is, however, designed as an improvement on all such previous proposals and is applied to a marine vessel of the type comprising 10 stabilising fins situated astern and on each side of a propeller; and a vessel of this nature will be referred to herein-after and in the appended Claims as "a marine vessel of the type specified".

15 According to the present invention, a vessel of this type has stabilising fins which are each situated wholly abaft midship, which are made removable or adjustable in order to regulate or to vary 20 the degree of their submergence, and which are additional to the usual rudder or have portions that are movable rudderwise in place of or additional to a rudder.

25 Conveniently, they are so mounted as to be adjustable to a number of different positions or degrees of submergence although the invention contemplates the condition in which they are only adjustable so that they are either only sub- 30 stantially wholly submerged or substantially wholly unsubmerged. The invention also includes means to hold the fins substantially rigid with the hull of the 35 vessel whatever position of adjustment they have assumed and to provide what may thus be considered as the equivalent of keel members situated on opposite sides of the fore and aft centre line of 40 the vessel.

In a preferred form the fins are streamline in contour so as to offer the smallest possible resistance to their passage 45 through the medium through which the vessel is travelling. When it is travelling in smooth water or even when it is travelling through a head or following sea the fins may, and generally will, be 50 raised out of the water so as to remove entirely such resistance as they may offer to the passage and speed of the vessel through the water. At times when they are required to give directional stability 55 to the vessel they may be lowered to any degree up to their maximum submergible depth according to requirements.

In order that the invention may be more clearly understood two preferred constructions will now be described with 60 the aid of the accompanying drawings, in which:—

Figure 1 is a side elevation of part of the stern of the vessel showing the fin on that side;

65 Figure 2 is a section on the line 2—2

of Figure 1, looking in the direction of the arrows;

Figure 3 is a section taken through the hull on the line 3—3 of Figure 2, looking in the direction of the arrows but 70 showing the fins in full lines,

Figure 4 is a view corresponding to Figure 1 of a modified form of the invention, and

Figures 5 and 6 are other views similar 75 to Figure 1 showing further modifications of the invention.

Like reference numerals indicate like parts in the several Figures of the 80 drawings.

In the construction illustrated in Figures 1 to 3, the after portion or stern of the hull is indicated at 10 and in it there is mounted a cross-shaft 11 carried 85 in any convenient bearings such for instance as at 12 on each side and other bearings 13 mounted in an amidship bracket 14. The fins are indicated at 15 and are mounted outboard to rotate with the cross-shaft 11 being secured thereto 90 in any preferred manner. The fins can thus be rotated by means of the shaft 11 about the axis thereof.

The mechanism for rotating the fins comprises a reversible electric motor 16 95 connected through spur gearing 17, 18 to a worm 19 carried on a spindle 10 on which the spur gear 18 is mounted. This worm meshes with a worm wheel 21 fixed to the shaft 11 so that by rotating the 100 motor 11 in one direction or the other the cross-shaft 11 will be turned in one direction or the other to raise or lower the fins respectively.

In the fully raised positions of the fins 105 they assume those positions indicated in the chain lines in Figure 1 and in this position they are entirely clear of the water. The full line positions illustrate the fins at their greatest submergence 110 and as seen clearly from Figures 2 and 3 these fins are located on opposite sides of the propeller 22 and rudder 23.

For controlling the operation of the motor 11 any preferred electrical reversing gear can be employed and this is 115 illustrated diagrammatically at 24 with electrical connections to the motor indicated at 25; but as such reversing gear and connections are well understood and 120 of themselves form no part of the present invention it is thought unnecessary to describe them more fully therein.

In order that the fins may be held sufficiently rigidly to the hull of the 125 vessel in either position a portion of each fin is formed as a quadrant 26 concentric with the axial shaft 11. This quadrant is maintained at all times within the embrace of a guide 27 which is secured 130

to the hull and is formed with an arcuate slot (see Figure 3) to receive the edge of the fin. In the fully raised position a shoulder 28 abuts against the guide 27 so as to provide a positive stop beyond which the fin can be turned no further. In addition there is another guide or bracket 29 secured to the hull into which a portion of the leading edge 30 of the fin will pass and in which it will be housed when it is in its lowermost position and this guide or bracket has its outer surface formed as a faring to reduce as much as possible resistance to the travel of the bracket through the water.

There is a third means for aiding the rigidity of the fin when in its lowered position and this comprises a headed stud 31 secured to the fin, the head of which stud engages within an undercut slot in a bracket 32 secured to the hull.

There will be similar guides for both fins and thus in their lowermost positions they are held at three positions spaced around the axis of shaft 11 and are found in practice to be thereby maintained sufficiently rigidly even in rough weather. In order to stiffen the fins longitudinally each of them is made as a casting in which a longitudinally positioned internal tube 33 is included.

In order to prevent the fins from chattering when they are fully raised, an additional overhanging bracket 34 is secured to the hull in a position to engage what will be the upper edge 35 of the fin near its sternmost extremity and it will be understood that the three brackets 27, 29 and 34 are all made to overhang the corresponding edges of the fin as, for example, by being formed with slots into which those edges can enter.

Obviously the fins may be made adjustable in other ways. For instance, they may be hinged to swing up clear of the water or down into the water, lying in their inoperative positions against the sides of the vessel or under the bottom thereof; but in this case the depth of immersion will not be adjustable as they must be either fully immersed or fully inoperative. On the contrary, with the construction illustrated in Figures 1 to 3 the degree of immersion can be controlled by the operation of the motor 16 and the guides 29 and 32 can, if necessary, be made to maintain engagement with the fins over a considerable angle of adjustment of the latter, notwithstanding that in the illustration they have been shown as intended to be engaged only when the fins are in their fully lowered position.

As a further alternative the fins may be made to slide in guides of any preferred form and direction as to enable the fins to be adjustable as already described. An example of one such arrangement would be to form opposite edges of the fins with arcuate portions to be maintained in concentric guides such as 36, Figure 4. These guides are to be taken as exemplifying the possible sliding arrangements of the fins.

As a still further alternative the fins may be made completely detachable in which case means will be afforded by which when they are immersed they may be retained sufficiently rigidly in their operative positions.

One example of fins which are completely detachable is illustrated in Figure 5 in which each fin 15 is insertable from above into downwardly convergent guides 50 which latter embrace sufficient lengths of the fore and aft edges of the fins to hold them with required rigidity to the hull. The fins are fixed in position by bolts 51 which are screwthreaded into corresponding sockets provided in the hull of the boat. A handgrip 52 extends laterally from the upper extremity of each fin to facilitate manipulation thereof.

In the construction illustrated in Figure 6 the fins 15 are each insertable into similar guides 50 which in this case however converge upwardly so that each fin must be entered into the guides from below. Locking bolts and handgrip 51, 52 respectively are provided as in the last example.

Another disadvantage existing in vessels of the speed boat type is that the propeller is unprotected because it generally projects well below the under surface 37 of the hull. This is a source of danger if the vessel should run aground and, moreover, when the vessel is to be transported out of the water it is necessary to employ a cradle to support the hull and at the same to protect the propeller and tail shaft. The present invention overcomes the last-named difficulties because if the vessel is likely to run aground it is only necessary to lower the fins or to attach them in their operative positions to afford supports for the after portion of the hull on which it can rest to grip that portion of the hull raised sufficiently to protect the propeller from damage. The same applies during the transportation of the vessel out of the water, the fins, when they are lowered, virtually constituting a cradle.

In order to render the fins more effective as stern supports when the vessel is aground, flat plates or feet 38 (Figures 180

1, 2 and 3) may be attached to the lower ends of the fins with the surfaces of the feet disposed in planes transverse to the lengths of the fins.

5 These plates may be secured to the fins in any preferred manner so that they are readily detachable and in the example illustrated the plates have upwardly extended bifurcated arms 39 and a pin 40 passes through the two arms and through the fin itself. In this way the plates can be readily detached and thus can be used at times when it is desired to employ the fins as stern supports.

15 In order to assist in counteracting any drag that the fins may be found to impose upon the vessel tending to hold the stern down too heavily or deeply, detachable under-water planes 41 (Figure 20) may be utilised and are conveniently secured to the fins by pins 42 screwing into the fins and passing through arcuate slots 43 in bosses of the planes. Thus, the angle of incidence of the planes can be adjusted and the pins 43 tightened up to hold them in the adjusted positions.

The means for locking the fins in position such as the parts 27, 29, 31, 32, 34 and 36, the means for attachment of the feet and the means for attachment of the planes are to be taken as examples only of such parts and are not to be considered as in any way limiting the invention to the particular constructions and arrangements of those parts as illustrated in the drawings.

The invention furthermore is not restricted to the simultaneous use of both fins as either one or other or both may be utilised at will and if this divided use of the fins is desired the driving connection between the motor 16 or its equivalent mechanical operating mechanism and the fins themselves will be modified accordingly. Such modification, however, requires no invention and it will be readily understood by marine or other engineers by whom such parts will be fitted.

50 In place of employing separate feet 38 and under-water planes 41 the feet themselves could be made angularly adjustable about the axis of their pivots such as 40 and could be shaped to be utilised as under-water planes if desired. They could quite obviously be secured to the fins in other ways as, for example, by hinging or bolting and in the case in which they are hinged they could, when not required for use, be arranged to fold up flat against the surface of the fins or in an alternative form they could be hinged outwardly to form virtual continuations of the fins themselves.

65 It is within the invention, although it

is not illustrated in the accompanying drawings, to construct the fins so that as a whole or in part they may be adjusted rudderwise for steering purposes and thus used in place of or in addition to the usual rudder 23. In such an arrangement the fins may be actuated individually or together for steering purposes with or without the rudder.

Moreover, the rudder itself may be of the type that can be raised and lowered in order to adjust the depth of submergence thereof to give the optimum position having regard to eliminating as far as possible rudder resistance.

The adjustability of the fins rudderwise or the adjustability of the rudder itself will, within this invention, be employed in conjunction with the adjustability of the submergence of the fins or the removability thereof. Rudderwise adjustment of fins or bodily adjustment of the rudder are features which in themselves are known and which per se constitute no part of the present invention.

It will be observed that in the preferred examples the fins only extend in a fore and aft direction for a very small proportion of the length of the vessel from the stern transom to the midship position and fins of such relatively small fore and aft dimensions are found to be greatly advantageous over others which have previously been suggested as extending, when fully lowered, for the major portion of the length of the vessel. Fins according to the present invention give all the requisite stability which would be obtained with those of greater dimensions but as compared with the present invention the longer fins adversely affect the steering of the vessel to such an extent as to render their use undesirable despite the directional stability obtained with their aid. Moreover, by making the fins, as in the present invention, entirely unsubmergible or adjustable as to the degree of submergence, a very great advantage is obtained over previous cases where relatively small fins have been employed permanently in that the degree of directional stability to be obtained from the fins may be adjusted to suit the requirements of the vessel from moment to moment.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A marine vessel of the type specified having stabilising fins which are each situated wholly abaft midship, which are

made removable or adjustable in order to regulate or to vary the degree of their submergence, and which are additional to the usual rudder or have portions that  
5 are movable rudderwise in place of or additional to a rudder.

2. A marine vessel according to Claim 1 in which the fins are so mounted that they may be each adjustable to a number  
10 of different positions or degrees of submergence.

3. The subject-matter of either one of the preceding Claims in combination with interlocking devices between the  
15 fins and the hull of the vessel for holding the fins sufficiently rigidly with relation to the hull.

4. The subject-matter of Claim 3 in which the interlocking means comprise  
20 slotted or overhanging brackets secured to the hull and adapted to embrace marginal portions of the fins.

5. The subject-matter of Claim 3 or Claim 4 in which the interlocking devices  
25 engage each fin at three triangularly displaced positions.

6. The subject-matter of any one of the preceding Claims in which the fins are  
30 pivotally mounted to turn about fixed axes.

7. The subject-matter of Claim 6 in which the fins are both mounted on a thwartship cross-shaft and a reversing

motor or other mechanical means is coupled to the shaft to rotate it for  
35 adjustment of the fins.

8. The subject-matter of any one of the preceding Claims combined with feet on or detachably secured to the fins at  
40 what will be their lowermost positions when they are submerged, for the purpose described.

9. The subject-matter of any one of the preceding Claims in combination with under-water planes carried by the  
45 fins, which planes are fixed or adjustable and tend to lift the stern of the vessel when it is under way.

10. The subject-matter of any one of the preceding claims in the form in which  
50 each fin can be independently operated.

11. The subject-matter of any one of the preceding Claims in a modified form in which the adjustment or movability of the fins is by sliding or hinging move-  
55 ments or by complete attachment and detachment.

12. A marine vessel having fins 15 and means for actuating them, substantially as shown in the accompanying drawings. 60

Dated this 25th day of July, 1937.

BOULT, WADE & TENNANT,  
111 & 112, Hatton Garden, London,  
E.C.1,

Chartered Patent Agents.

Fig. 1.

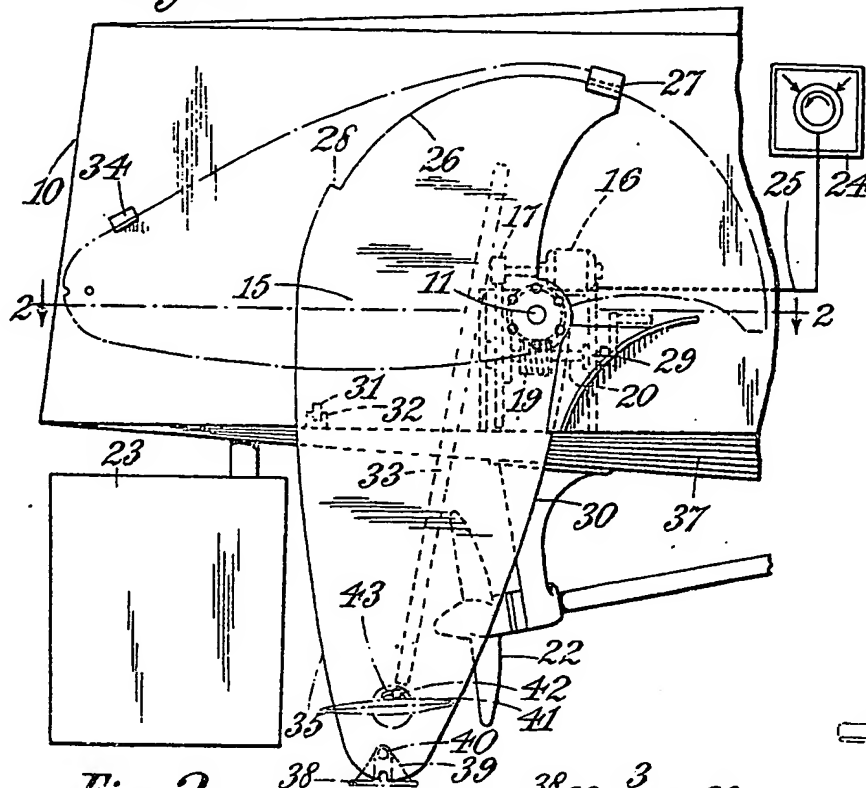


Fig. 2.

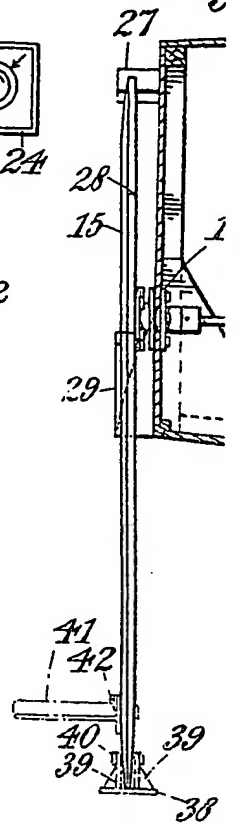
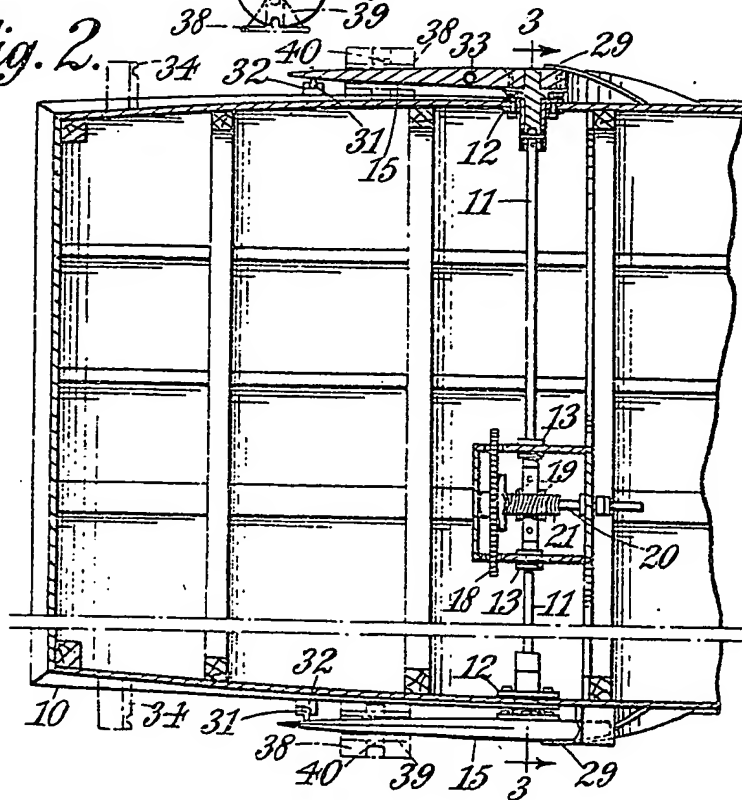


Fig. 2.



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Fig. 3.

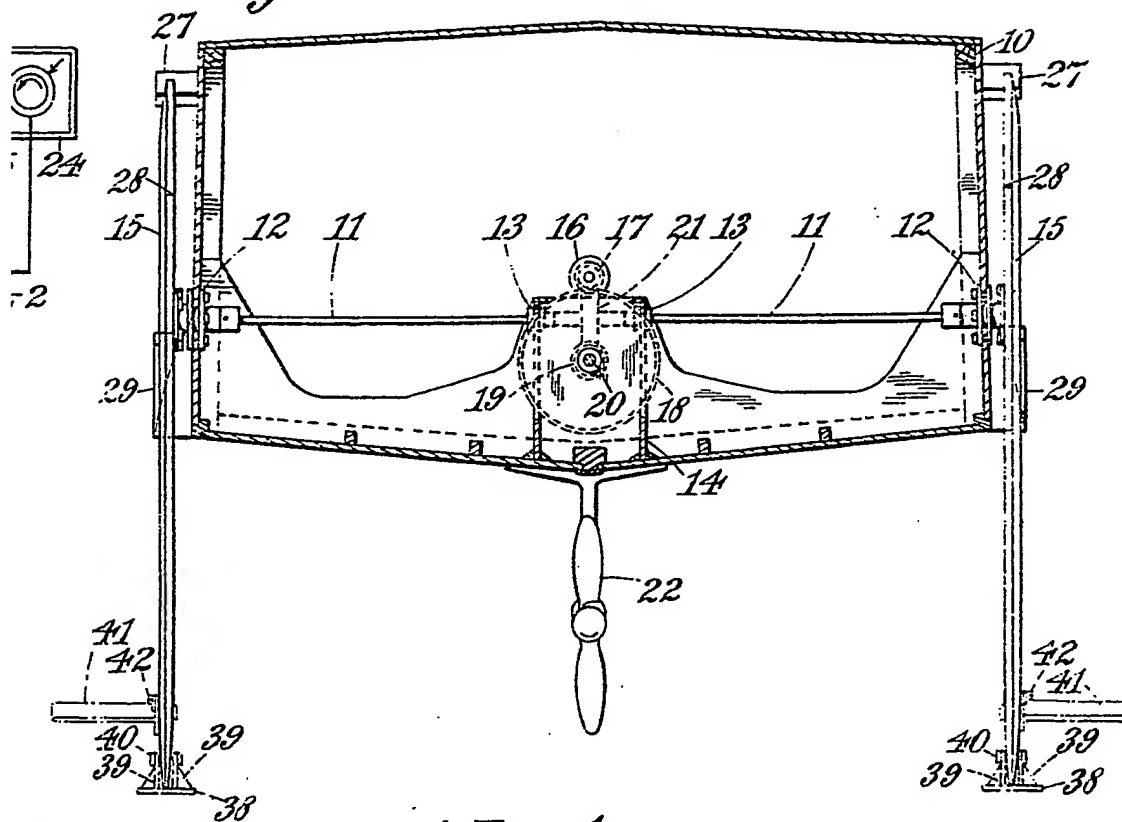
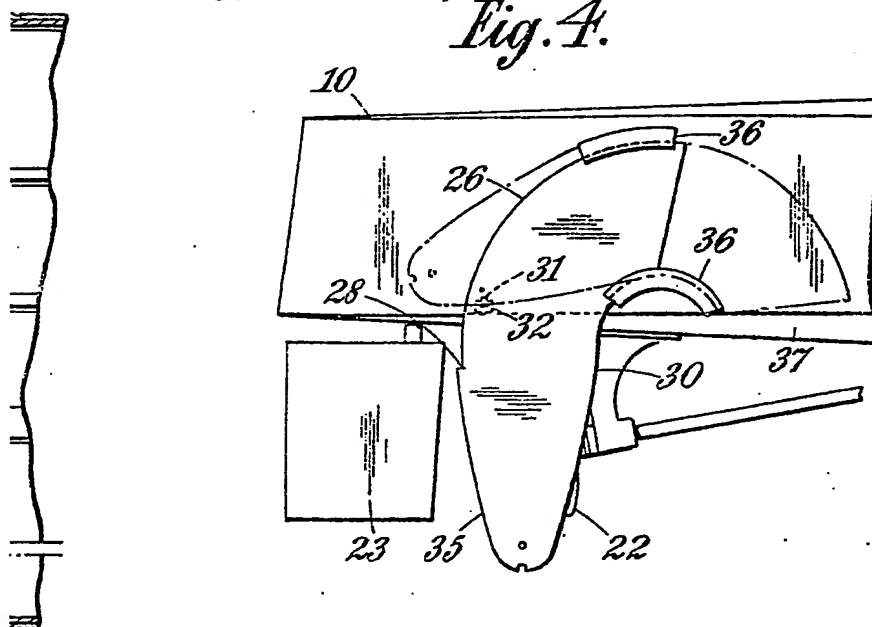


Fig. 4.



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Fig. 1.

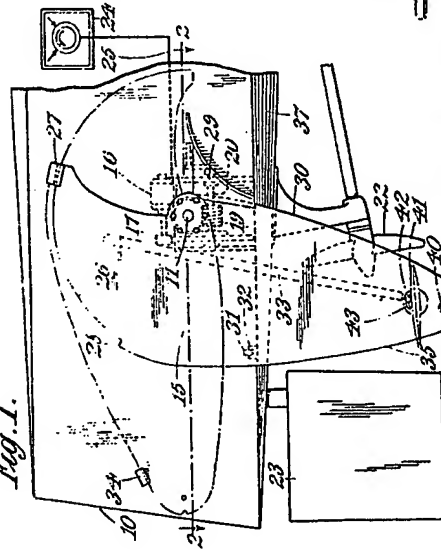


Fig. 2.

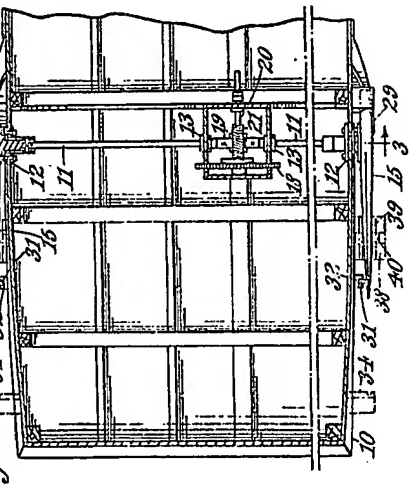


Fig. 3.

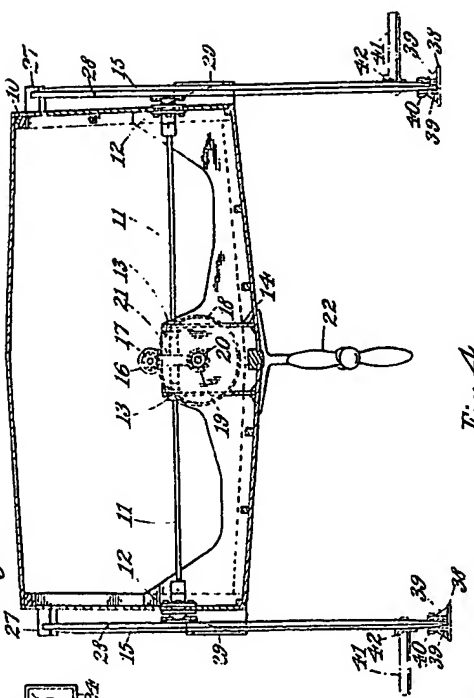
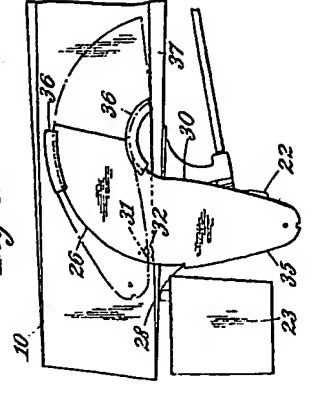
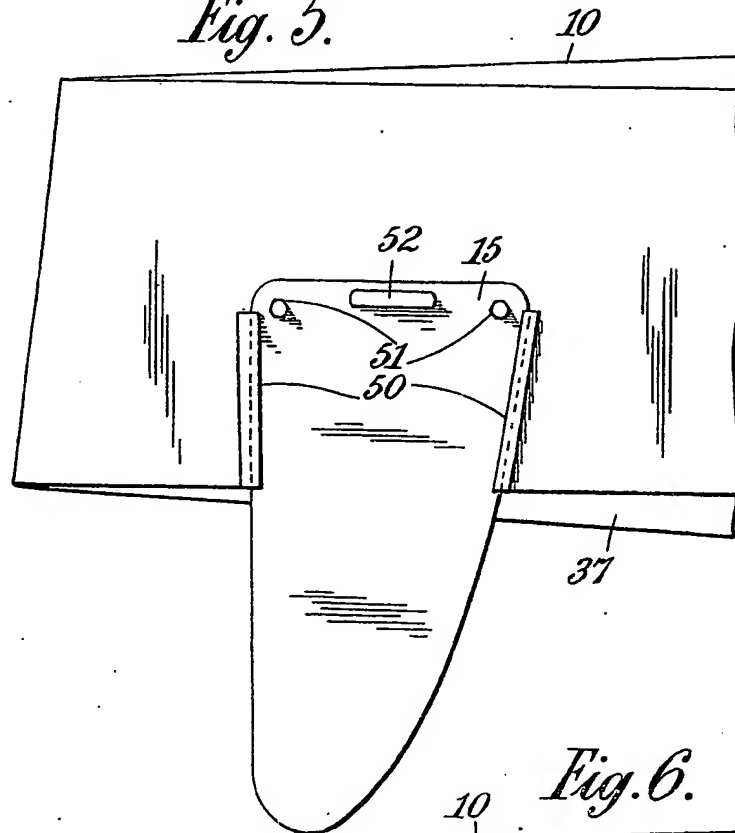


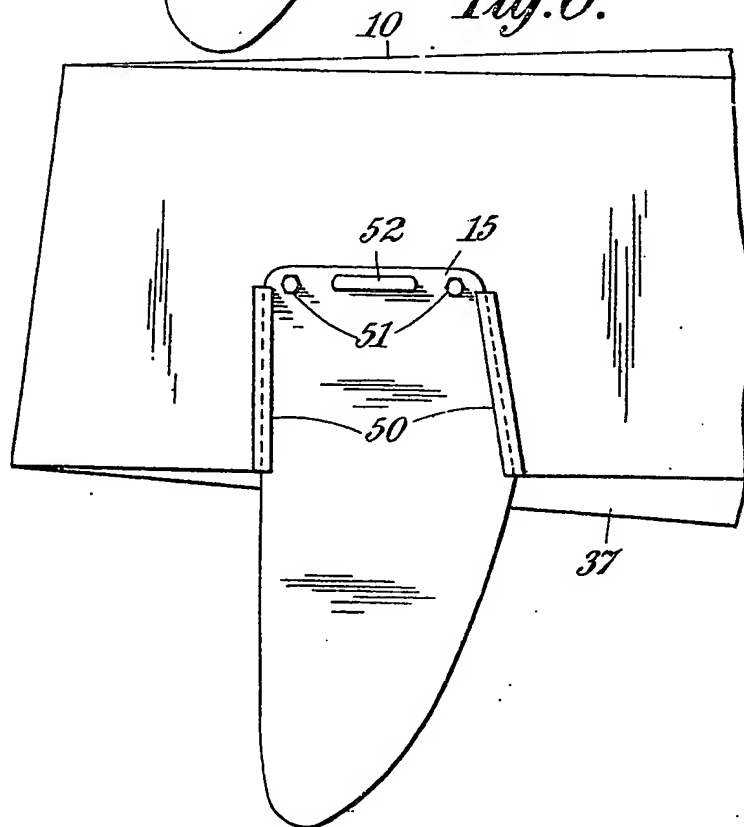
Fig. 4.



*Fig. 5.*



*Fig. 6.*



*[This Drawing is a reproduction of the Original on a reduced scale.]*